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EXAMINER
AMPONSAH, OSEI K

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JAMES MITCHELL,
LIJUN ZOU, and TIMOTHY J. FULLER

Appeal 2015-008307
Application 13/568,494[1]
Technology Center 1700

Before KAREN M. HASTINGS, GEORGE C. BEST, and
N. WHITNEY WILSON, *Administrative Patent Judges*.

BEST, *Administrative Patent Judge.*

DECISION ON APPEAL

The Examiner rejected claims 1, 3–10, 20, and 21 under 35 U.S.C. § 103(a) as obvious. Final Act. (July 8, 2014). Appellants seek reversal of these rejections pursuant to 35 U.S.C. § 134(a). We have jurisdiction. 35 U.S.C. § 6(b). For the reasons set forth below, we AFFIRM.

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[1] GM Global Technology Operations LLC is identified as the real party in interest. Br. 2.

BACKGROUND

The '307 Application describes a method for making a metal electrode assembly for a fuel cell. Spec. ¶ 7. The metal electrode assembly includes an ion-conducting membrane disposed between cathode and anode catalyst layers. *Id.* The '307 Application further describes improved methods for making the ion-conducting membrane. *Id.* at ¶¶ 1, 8.

Claim 1 is representative of the '307 Application's claims and is reproduced below:

> 1. A metal electrode assembly for a fuel cell, the metal electrode assembly comprising:
>
> a cathode catalyst layer;
>
> an anode catalyst layer; and
>
> an ion conducting membrane disposed between the cathode catalyst layer and the anode catalyst layer, the ion conducting layer including a polyphenylene sulfide mat with a first polymer imbibed therein, polyphenylene sulfide mat including polyphenylene sulfide-containing structures wherein the polyphenylene sulfide-containing structures are selected from the group consisting of beads, spheres, and oblong shapes.

Br. 1 (Claims App.).

REJECTIONS

On appeal, the Examiner maintains the following rejections:

1. Claims 1, 3–4, 6–10, 20, and 21 are rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Nishibori,[2] MacKinnon,[3] and Okanishi.[4] Ans. 3.
2. Claim 5 is rejected under 35 U.S.C. § 103(a) as unpatentable over the combination of Nishibori, MacKinnon, Okanishi, and Kinoshita.[5] Ans. 7.

DISCUSSION

Appellants argue for the reversal of the rejections to claims 3–5, 6–10, 20, and 21 on the basis of limitations present in claim 1. *See* Br. 2–6, 7. We, therefore, limit our analysis to claim 1 for the rejections of these claims. Claims 3–5, 6–10, 20, and 21 will stand or fall with claim 1. 37 C.F.R. § 41.37(c)(1)(iv).

Appellants separately argue for the reversal of the rejection of dependent claim 9. *See* Br. 6–7.

Rejection 1 and **Rejection 2.** We affirm both obviousness rejections based upon the factual findings and reasoning set forth on pages 3–13 of the Examiner's Answer, which we adopt. We add the following for emphasis.

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[2] JP 2003-077494 A, published Mar. 14, 2003. We shall follow the Examiner and Appellants by referring to a machine translation that was made of the record in this appeal on January 2, 2014.

[3] US 7,897,693 B2, issued Mar. 1, 2011.

[4] US 2010/0062304 A1, published Mar. 11, 2010.

[5] US 2009/0246592 A1, published Oct. 1, 2009.

Appellants separately argue that the rejection of claim 9 should be reversed. We address Appellants' arguments in turn.

First, Appellants argue, *inter alia*, that the rejection of claim 1 should be reversed because neither Nishibori nor Okanishi teaches or suggests that "polyphenylene sulfide-containing structures selected from beads, spheres, and oblong shapes are able to imbibe a polymer therein." Br. 4; *see generally* Br. 3–4.

Claim 1, however, does not require that the recited polyphenylene sulfide-containing structures are able to imbibe a polymer. The claim only requires a polyphenylene sulfide mat with a first polymer imbibed therein. *See* Ans. 10. The Examiner provided an adequate reason to combine Nishibori, the primary reference, with Okanishi, the secondary reference, to describe a metal electrode assembly for a fuel cell that meets these limitations. The Examiner found that Nishibori teaches an ion conducting membrane in the form of a reinforcing member for solid polymer electrolytes. Ans. 3 (citing Nishibori ¶ 9). The Examiner further found that the disclosed membrane includes a nonwoven fabric made of polyphenylene sulfide fiber, which is "immersed and . . . impregnated" with perfluorocarbon-sulfonic-acid resin (i.e., "a first polymer imbibed therein" (claim 1)). Ans. 9 (citing Nishibori ¶¶ 44–47); *see also* Ans. 3 (citing Nishibori ¶¶ 10–12, 44–49).

The Examiner acknowledges that Nishibori does not teach using polyphenylene structures in the form of a sphere. Ans. 4. The Examiner, however, found Okanishi teaches a fuel cell in which a polymer electrolyte membrane includes reinforcement polyphenylene sulfide particles in fiber-like or spherical shapes. Ans. 4 (citing Okanishi, ¶¶ 279–80, 373–74). The Examiner relied upon this subsidiary finding to determine that a person of

ordinary skill in the art at the time of the invention would have substituted Okanishi's spherical-shaped particles for Nishibori's fiber-like particles when either structure provides predictable results of increased membrane strength. Ans. 4. We do not discern reversible error in these findings.

Second, with respect to claim 9, Appellants argue that **Rejection 1** should be reversed because the Examiner's determination "that the 'simple substitution of one known element (perfluorocyclobutyl-containing polymers) for another (perfluorocarbon-sulfonic-acid polymer)' renders the present claims obvious is an over-simplification." Br. 6. According to Appellants,

> [p]olymers that contain perfluorocyclobutyl groups are very different than the standard perfluorocarbon-sulfonic-acid polymers that are used in fuel cells. The perfluorocyclobutyl-containing polymers have cyclobutyl rings which are of course highly strained. This very different chemical structure makes their properties **unpredictable** as compared to perfluorocarbon-sulfonic-acid polymers which do not have cyclobutyl groups.

Id.

We are not persuaded by these arguments. Although Appellants correctly state that cyclobutyl rings are strained, they do not point to any evidence that such rings provide unpredictable properties as compared to perfluorocarbon-sulfonic-acid polymers. Without such evidence, this assertion is not persuasive. *See Estee Lauder Inc. v. L'Oreal, S.A.*, 129 F.3d 588, 595 (Fed. Cir. 1997) ("[A]rguments of counsel cannot take the place of evidence lacking in the record.").

As the Examiner found, Ans. 11 (citing MacKinnon 4:3–67), MacKinnon teaches a polymeric ion conducting membrane comprising perfluorocyclobutyl-containing polymers. The Examiner determined that it would have been obvious for the ordinary skilled artisan to use

perfluorocyclobutyl containing polymers in Mackinnon's solid polymer electrolyte because such polymer electrolyte membranes maintain high ionic conductivity and mechanical stability at both high and low relative humidity. *See* Ans. 11–12 (citing MacKinnon 1:17–21). Thus, we do not discern reversible error in the Examiner's findings or in the Examiner's conclusion that the applied prior art would have suggested the claimed perfluorocyclobutyl-containing polymers as set forth in Claim 9.

We, therefore, affirm the Examiner's rejections of: (i) claims 1, 3–4, 6–10, 20, and 21 as unpatentable over the combination of Nishibori, MacKinnon, and Okanishi; and (ii) claim 5 as unpatentable over the combination of Nishibori, MacKinnon, Okanishi, and Kinoshita.

CONCLUSION

For the reasons provided in the Examiner's Answer, and above, we affirm the rejections of claims 1, 3–10, 20, and 21 of the '307 Application.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED